Pure vs. Mutual Sick Insurance Societies.

Evidence from Swedish Historical Data*

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Abstract

Using data from voluntary Swedish sick insurance societies 1902-1910, this paper analyzes the coexistence of pure and mutual insurance societies where pure societies are characterized by charging *ex ante* premiums only while mutuals in addition charge *ex post* assessments. Mutual insurance societies are found, on average, to be larger and to offer longer insurance coverage duration. Pure insurance societies have, on average, higher insurance coverage per day, greater mean levels of moral hazard controls, a higher mean number of policy categories and are on average, older.

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1 Introduction

This study uses a unique historic data to analyze the coexistence of pure and mutual insurance societies. Although there is a fairly extensive literature on the theoretical differences between these insurance types as well as the nature of their coexistence,[1] the empirical work is scant. Pure and mutual insurance differ in their choice of financing system. Pure insurance societies use *ex ante* premiums only while mutual insurance societies in addition to *ex ante* premiums, also excise assessments *ex post*. Mutual insurance is therefore a form of risk sharing between members. This type of insurance is expected to cater to smaller groups of homogenous, in terms of risk, members, motivated to control moral hazard problems. The fixed contracts offered by pure insurance societies cater in turn, to a more heterogenous, potentially higher risk clientele who without specific controls, lack the motivation to minimize moral hazard problems. A parallel study (Nekby *et al.*, 2000), based on the same data, indicate that economies of scale in insurance provision differ between these insurance types where mutual insurance societies exhibit returns to scale whereas pure insurance societies do not. It is argued that this is due to a sorting effect. This paper, using insurance society data, will empirically study whether theoretical predictions concerning size, premiums, benefits and moral hazard control, rendering from choice of financing system, are upheld and whether these differences support the hypothesis of a sorting effect.

The data, covering all Swedish sick insurance societies from 1892-1910, was compiled as a result of the *1891 Law of Registered Sick Insurance Societies* offering an administration subsidy to all sick insurance societies who freely registered with the government. As such detailed information concerning both financial and policy variables of insurance societies became available. The pre-1910 insurance market was otherwise largely unregulated and insurance societies were free to set policies concerning type of financial system. This rich data set therefore provides a unique opportunity to examine empirically theory concerning pure and mutual insurance. In order to do so, this study uses the society data to generate indicators for

[1] See Born *et al.* (1995), Marshall (1974), Skogh (1999), Smith & Stultzer(1995), van der Linden (1996), Wu (2000).

variables of interest and analyzes differences across insurance types. To test the robustness of these results when controlling for society size and differences in registered sick levels (among others), a logit analysis is performed. Finally, in order to check that systematic differences between societies with longer/shorter registration periods do not influence the results, an analysis is run on a balanced sub-panel of insurance societies.

The main results are that mutual insurance societies are not constrained to smaller membership sizes. Mutuals appear to offer longer insurance coverage duration while pure insurance societies provided greater coverage per day. A variable incorporating both dimensions, i.e., level and duration, indicates that on average mutuals insurance societies are associated with more generous insurance policies. Consistent with theoretical predictions, pure insurance societies are found to have more stringent moral hazard controls, a greater mean number of policy categories and are, on average, older.

This paper continues with a brief section describing the historical background to this panel data set followed by a section discussing the theoretical work concerning pure versus mutual insurance. Section 4 describes the data and the empirical set up. Sections 5-7 systematically analyze the variables of interest; membership size, insurance benefits and premiums and moral hazard controls. Section 8 discusses other differences between pure and mutual insurance. Section 9 presents the logit analysis estimating the probability of being one or the other insurance type and the effect various variables have on this likelihood. This is followed by a section discussing selection issues. The paper is concluded in section11.

2 Historical Background

The first sick insurance societies were established in Sweden in the early 1700's within various trade guilds. It is not however until 1870-1885, that a surge in establishment is noted associated with this period's rapid industrialization and urbanization. A parliamentary committee set up in 1884[2] to study the emerging insurance market observed that the sick coverage

[2] *Arbetareförsäkringskommittén*

offered by the existing insurance societies was small[3] and uncertain in the sense that insurance societies frequently dissolved leaving members without insurance. In order to stimulate the development of sick insurance societies, the 1891 *Law of Registered Sick Insurance Societies* implemented an administrative subsidy for those societies who voluntarily registered with the government.[4] Registration implied sending annual financial statements as well as information concerning policy statutes to the *Department of Public Administration* and after 1901, to the *National Board of Trade*. Although successful in stimulating the development of especially small insurance societies, it was apparent that the emerging market had problems both in terms of reaching a greater proportion of the population[5] and in terms of providing safe insurance options. Fierce competition led to financially unsound policies and due to the high rate of closures, uncertain health coverage.[6] The subsequent 1910 Law of Registered Sick Insurance Societies increased regulation while maintaining the voluntary nature of the Swedish sick insurance system. Among other regulations, *ex post* assessments were forbidden except for temporary budget deficits. The 1910 law therefore effectively marks the demise of Swedish mutual insurance societies as defined here.[7]

[3]The average amount of sick insurance coverage per week was 7:24 SEK for male members and 5:70 SEK for female members in current prices (Tegendal (1949)). For comparison, note that the average annual income for a manual worker who recieved board via the employer was 172 SEK in current prices in Sweden,1893. Our data shows an average sick insurance coverage of 8:80 SEK per member and week, 1902-1910.

[4]See Table 1 for number of insurance societies and number of members for Stockholm and Östergötland, 1902-1910.

[5]In 1905, 85 percent of active sick insurance societies were registered covering approximately 14.1 percent of the adult (15 years and older) population (Edebalk, 1996).

[6]Berge (1995), Edebalk (1996)

[7]Historical studies on the Swedish insurance market include Lindeberg (1949), Lindquist (1990), Berge (1995), Edebalk (1996) and Edebalk et. al. (1998). A special issue on the topic was published by the Journal of the Archive and Library of the Swedish labour movement (1999). Included in this issue are studies by Andersson (1999), Edebalk (1999), Grip (1999), Johansson (1999a), Johansson (1999b). These contributions are in Swedish, however, Simonson (1996) has an English overview published in van der Linden (1996).

3 Theoretical Background

The coexistence of pure and mutual sick insurance societies which characterizes the pre-1910 Swedish insurance market renders the question as to how these two insurance forms differ. Do they cater to different segments of the market? Is the market large enough or varied enough for the two forms to coexist? Do they offer different insurance options and at different costs? The theoretical work points to a number of differences which this section summarizes in brief.

Mutual insurance is a pooling of risk between members. Mutuals can be defined broadly. van der Linden (1996) for example, defines mutuals as "associations formed voluntarily for the purpose of providing their members with financial assistance in case of need". This paper, however, focuses on Skogh's (1999) more stringent definition. Mutual insurance is an agreement on sharing of losses *ex post*. As such it differs from the pure insurance option in which insurees trade risk with an insurer at a premium fixed *ex ante*. Although mutuals can combine *ex ante* fees with *ex post* assessments and do not necessarily excise assessments every year, pure insurance societies utilize *ex ante* fees only.

Mutuals arose as an efficient means of addressing contract challenges caused by aggregate uncertainties, that hindered pricing and operation, and moral hazard. These two themes dominate as to why mutuals arise and thrive alongside pure insurance societies. The original mutuals were based on implicit or explicit guarantees between members to support each other in the event of an accident or illness. Based on mutual trust, this type of agreement was found among groups that had long term relationships with one another such as within families, syndicates, unions and professional groups. As such mutual sharing of loss is expected among groups with similar risks, common knowledge of possible moral hazard and repeated exchange, reputation or some other form of social control.[8]

Risk sharing in the mutual insurance framework is based on the presumption that all in the pool face the same risks.[9] Agents assume that they are faced with the same potential losses and the same underlying

[8]Skogh (1999)
[9]Skogh (1999)

probabilities of loss. The actual probabilities are not known *ex ante* but as information about risk develops, mutuals may have to adjust their policies. In addition the mutual insurance form often developed to serve a clientele committed to risk reduction and the control of moral hazard. One way of inducing appropriate behavior to minimize risk probabilities is to have insurees bear part of the profit risk associated with aggregate variability. The *participating contract*, i.e., contracts that allow taxation of assessments *ex post*, of the mutual insurance form serves this function.[10]

As mutual societies grow in number, trust between members may diminish leading to the need for premiums *ex ante* in addition to the characteristic assessments *ex post.* Wu (2000) shows that as information about risk becomes available, mutuals develop similar contract solutions for different risk groups and for asymmetric information as pure insurance societies. This despite the assumption that mutuals have an institutional form used to control adverse selection and moral hazard problems. Low risk insurees signal their type by purchasing participating contracts from mutual cooperatives, while high risk insurees prefer insurance contracts with fixed premiums. Although members in the same mutual are assumed to have similar risks and presumably know the insured risk better than insurers, growth may necessitate policies dealing with issues of asymmetric information.

One of few previous empirical studies on the coexistence of pure and mutual insurance societies, Born *et al.* (1995) find that historically, the mutual insurance form was able to offer lower fees than pure insurance societies.[11] Several reasons for this are stipulated. Mutuals ameliorated monitoring problems. Mutuals screened prospective members in an effort to insure only the better risks. Mutuals offered services such as loss prevention recommendations. Members were seen as participants in a long-term relationship. Finally the common interest of mutual members in reducing insurance costs may have reduced moral hazard problems.[12] Born *et al.* also find that relative to mutuals, pure insurance societies are more likely

[10]Smith and Stutzer (1995)

[11]Born *et al.* (1995) analyse the coexistence of mutual and *stock (*defined here as pure) insurance companies in the U.S. property-casualty insurance industry.

[12]A contrary view is provided by Marshall (1974) who postulates that most mutuals avoid using assessments by charging sufficiently high initial premiums.

to reduce their business in unprofitable situations. For a given amount of premiums, pure insurance companies have larger losses than mutuals. Their results are consistent with the theoretical arguments that mutuals are more careful in screening and better able to attract lower risk insurees than the pure insurance societies.

4 Data Description and Empirical Set-up

The data, compiled first by the Department of Public Administration (*Civildepartementet*) and after 1900, by the National Board of Trade (*Kungliga Kommerskollegiet),* contains annual information from all registered Swedish sick insurance societies from 1892-1910. The society data consists of two sets: financial accounts and policy statutes. The financial accounts contain detailed information on income and expenses, number of members, sick cases and sick days, all by gender, as well as information regarding assets and debts. The policy statutes yield information concerning optional/mandatory membership, number of policy categories, age and sex restrictions for membership, premium and assessment levels, regulations regarding eligibility for sick and funeral coverage, as well as benefit levels[13].

The data used in this paper come from two regions, Stockholm City and Östergötland County. These regions were chosen in order to include both a larger metropolitan area and a more rural area.[14] The data from 1892-1901 are dropped due to poor registration compliance. Left is a data set that consists of annual information from a total of 493 registered societies (3,849 observations) divided between 222 mutual insurance societies (1,770 observations) and 271 pure insurance societies (2,079 observations). The insurance societies are coded as pure insurance societies if they register income from initial fees and annual premiums only and as mutuals if they in addition, register income from assessments during any of the nine years under observation. The policy data give information on assessment levels due to illness among all members, i.e., the amount taxed for sick insurance

[13]See Appendix for full variable list.

[14]Selection of only two regions is also motivated by the large amount of data in published tables that must be transferred into machine-readable format.

per week and member. However only thirteen societies stipulate assessment levels in the statutes (103 observations), presumably the majority of mutuals maintained the freedom to charge varying assessment levels. For this reason the definition of pure contra mutual insurance focuses on the societies' revenue statistics and not on the policy variables.

The theoretical differences between pure and mutual insurance societies are to a large degree based on how insurance societies' choice of financing system influences membership, both in terms of risk types and in terms of behavior. As such, one would optimally like to study individual insurees' choice of insurance society and the personal characteristics of these members. Lack of individual data prevents this. The available society data however can give an indication of membership characteristics. The data are grouped into several categories indicating benefit levels and duration, costs to members of insurance coverage, moral hazard control policies, organizational form and financial status. Potential differences across insurance types are analyzed.[15]

Based on sample means and means tests, sections 6-8 analyze the data focusing on the differences between pure and mutual insurance societies and where relevant, relating the results to theoretical predictions.[16] A thorough analysis of the data is motivated by the lack of previous empirical work in general and of this data set in particular. A sensitivity analysis is completed for all variables checking to what degree outliers influence the results, but reported only when results are affected. To further check the robustness of the results when controlling for various measures of registered sick levels, society size, and financial status (among others) a logit analysis is completed on the full sample. Note that this is a so called unbalanced panel in that there is entry and exit of societies during the nine year period under observation and that there are competing unregistered insurance societies at the time for which there is no available data. As such, the potential biases stemming from these selection issues are discussed and analyzed in a separate section. The idea is to use all available dimensions

[15] Although a majority of the sick insurance societies offered funeral insurance as well, focus is on sick insurance as moral hazard problems do not arise with funeral insurance.

[16] Tables 2 and 3 show the sample means of the variables derived from, respectively, the financial accounts and the policy statutes.

of the data in order to fully check the stability of the reported results.

5 Membership size

The mean for membership size, shown in Table 2, indicates that mutual insurance societies tend to be larger than pure insurance societies, although the variation in size is also much greater.[17] Excluding these larger societies from the statistics reduces the mean membership size,[18] but mutuals remain, on average, larger than their pure insurance counterparts.

Although Stockholm societies, are larger than those from Östergötland, the above pattern across insurance types is upheld within each region.[19] Membership size may be correlated to organizational form. Table 4 shows that the *open* and *national* organizations had the largest mean memberships across both insurance types. Mutuals are to a larger degree composed of these two organizational forms.[20]

As the mutual insurance form is based on a pooling of risk among homogenous risk groups and presupposes social control over and trust in co-members, one would have expected smaller membership in this type of insurance society. In addition, it is surmised that upholding member similarity during expansion may be difficult.

[17]Of the population of mutuals, 5 percent are larger than 1,031 members during the period 1902-1910. This corresponds to twelve mutual insurance societies who are outliers in terms of size during some or all of the observed years. One of these societies, *Föreningen Enighet Ger Styrka (*Unity Gives Strength), had an annual membership level exceeding 13,000 members and recorded the largest membership overall, 15,838 members in 1909. Only two societies had membership levels exceeding 5000 members, the above and *Föreningen Vänfast (Constant in Friendship) sbk,* both Stockholm societies.

[18]Removal of outliers for mutual insurance societies reduces the mean to 214.5 members (st. dev.: 197.2)

[19]Mean members (st. dev. in parenthesis)

	Stockholm	Östergötland
mutuals	512.13 (1487.89)	194.61 (213.34)
pure	327.35 (481.01)	180.21 (143.29)

[20]The two main outliers in terms of membership size, *Föreningen Enighet Ger Styrka* and *Föreningen Vänfast (sbk),* were both *open* mutual insurance societies.

6 Insurance benefits and premiums

This section will look at differences in sick insurance provision and the premiums/assessments charged to members for this coverage. Insurance benefits are comprised of two dimensions, level and duration. Lack of individual data prevents analysis of individual insurance solutions however the society data provides indicators of insurance provision.

A look at Table 3, the sample means for policy variables, shows that mutuals did not stipulate, on average, significantly higher sick insurance *coverage per week* nor did they specify longer insurance coverage duration. Using the financial data on each societies expenses for sick insurance benefits, three indicators for insurance coverage were generated; s*ick insurance per registered member, per registered sick case* and *per registered sick day.* Two of these show that mutuals had, relative to pure insurance societies, significantly greater mean expenses for sick benefits.[21] The policy variables therefore do not indicate significantly higher or longer sick insurance coverage for mutual societies although actual expenses for sick coverage appears to differ across insurance types.[22]

Turning to the insurance costs to members, i.e., the premiums and assessments paid for insurance coverage, both the policy and financial data provide relevant indicators. The policy data contain information on initial membership fees as well as annual premiums. Assessment levels are also given for both sick coverage and funeral coverage. The latter are posted *ex ante,* i.e., indicate the amount each member is taxed for illness or death among all members.[23] The total costs of insurance to members within mutuals is therefore difficult to appreciate as members may have incomplete knowledge of illness probabilities within any given mutual society. The

[21] Mean s*ick coverage per sick case* is significantly larger for mutual insurance societies compared to pure insurance societies at the 10% level.

[22] One can mention that medical coverage, i.e., reimbursements for physician care or medicine, is on average larger, within the pure insurance form. This form of coverage was not however, used extensively among Swedish sick insurance societies (Lindeberg, 1949). In our data, 75 percent of societies had zero expenses for medical outlays both in terms of medical coverage per sick day and medical coverage per registered sick case. This is true of both pure and mutual insurance societies.

[23] A majority, 95 percent, of mutual sick insurance sociteties do not however specify assessment levels in the policy data.

sample means for these policy variables indicate that there are *ex ante* differences in initial fees and annual premiums. The mutual insurance type has significantly lower mean initial fees but higher mean annual premiums than the pure insurance type. In addition, members of mutuals have a positive probability of being charged an assessment *ex post*. As such it appears that mutual sick insurance is, on average, annually more expensive to members.

The financial data, in turn, provides information on registered annual revenue per society, stemming from initial fees, annual premiums and assessments. These variables indicate that mutuals had significantly greater revenue per member stemming from membership fees than pure insurance societies. The mean for *average premium paid* is significantly larger at the ten percent level and this variable does not take into consideration the added expense to members of assessments. Taking into account *average assessments paid*, the mutual insurance form is, without a doubt, on average more expensive to members than the pure insurance form. In short, the mutual insurance type appears to spend more per member on insurance provision but at a greater expense, on average, to members.[24]

Higher insurance costs to members together with larger insurance benefits may then reflect a sorting of different risk types into different insurance options. Higher fees can act as a screening device to attract a higher income clientele.[25] A further indicator of insurance coverage is the amount, per society, spent on insurance benefits relative revenue from premiums and assessments, which provides a rough measure of the amount of insurance coverage members are getting, on average, for their money. The mean for the variable, *sick coverage per annual total fees*, shows no significant differences across insurance types. Taking account of only premiums, i.e. no assessments, yields results indicating that pure insurance societies have greater expenses for insurance benefits relative income from premiums. This underscores the importance of evaluating, *ex ante*, probable assessment levels. There is, in addition, large variation among mutuals in

[24]Two out of three indicators for registered illness levels show that mutual members register significantly higher mean levels. This may be a result of more generous insurance policies or alternatively may be the reason for greater expenses on insurance provision within mutuals.

[25]Income and health are also likely to be correlated in the pre-1910 period.

assessment levels.[26] With some degree of risk aversion, all else equal, the pure insurance form will be preferred. Risk aversion is also likely to be correlated to income where low income groups will prefer the known contracts of the pure insurance societies rather than risk potentially financially difficult assessments. In summary, there are no differences across insurance types, on average, in the amount spent by insurance societies in insurance provision per total fees paid for this insurance by members.

This section has shown that according to policy, there are no differences across insurance types in mean sick coverage. The financial data however show that mutuals had greater expenses on average for sick coverage. Both the financial and policy data show that mutuals set higher annual premiums. Including assessments, mutual sick insurance was, on average, annually more expensive to members.

7 Moral hazard controls

As the mutual insurance form presupposes membership homogeneity in terms of risk profiles and has a built in institutional form, the participating contract, to minimize moral hazard, one would expect the pure insurance form to more frequently use controls for moral hazard as well as to set higher levels. The sample means indicate that the data, in part, support this supposition. There are three registered stipulations for benefit eligibility in the policy data.[27] Insurance societies may of course have availed themselves of other controls not subject to registration. The first of these controls concerns *waiting time* after entry for sick insurance eligibility. In addition, the societies could use a *qualifying time* after onset of illness for sick insurance coverage,[28] for example sick insurance may be paid only from the third registered sick day. Finally, *minimum sick days* stipulates the minimum duration of an illness for which sick coverage is

[26]Society revenue from assessments has a range from 0 to 29,540 SEK with a mean of 234 SEK (st. dev.: 1,480 SEK). *Average assessments* (assessments/member) has a range from 0.002 to 105.82 SEK/member with a mean of 2.49 SEK/member (st. dev.: 5.16).

[27]*Gurantee fees* are also registered but used only by the mutual insurance form.

[28]Swedish: *karenstid*

paid.[29] The data indicate that the pure insurance form had significantly longer mean *waiting times* for sick insurance coverage eligibility, as well as a longer mean *qualifying time* after onset of illness.[30] There is no significant difference between the insurance types regarding mean *minimum sick days*. The percentage of each type of society using the available controls does not differ dramatically.[31]

In summary, two of the three indicators for moral hazard control available in the data show that the pure insurance form had significantly larger mean levels than the mutual insurance form. This support theoretical predictions that mutuals have built in controls for moral hazard behavior via the participating contract and social control over members.

8 Other characteristics

The two insurance types are evenly distributed in Stockholm, while pure insurance is relatively more prevalent in Östergötland.[32] Stockholm societies tend to be larger and more expensive, both in terms of costs to members in the form of premiums and assessments and in terms of society costs in

[29]In the data it is common that insurance societies avail themselves of one or the other of the latter two controls. When both are used, the stipulations tend to follow each other. For example the qualifying time may be six days and the minimum duration seven days. In other words, no insurance coverage is paid for the first six days of a registered illness and seven days must be registered for any insurance to be paid out, thereby giving the sick member in this example, one day of insurance coverage for one week out of work due to illness.

[30]Note that the variable mean *qualifying time* after onset of illness shows a large variation among pure insurance societies. The range for mutual insurance societies using this form of moral hazard control is from 1 to 15 days. For pure insurance societies the range is from 1 to 100 days. However, only five percent of pure insurance observations exceed 8 days. Three pure insurance societies have significantly larger values for qualifying time, *Seperators arbetares shk. (sbk.) (*Seperator's Worker's Sick Insurance Society) with an annual value of 70 days, *Stockholms fortsättningskassa (*Stockholm's Insurance Continuation Society) with 90 days and *Återförsäkringsföreningen "Gemensamhet" i Åtvidaberg (*Re-insurance Society 'Togetherness' in Åtvidaberg) with 100 days. The latter two appear to be 're-insurance' societies which provide insurance first after the initial insurance benefits are depleted for members with long-term illnesses. It would then be in line with this type of insurance to set longer qualifying times for sick insurance coverage.

[31]The percentage of societies indicating non-zero levels of the following moral hazard control variables, by type of insurance society:

waiting time-illness: mutuals 58.3%, pure insurance 54.8%; *qualifying time*: mutuals 11.0%, pure insurance 13.7%; *min. sick days*: mutuals 88.5%, pure insurance 90.8%.

[32]58.5 percent of Östergötland societies were pure insurance societies.

the form of expenses for sick coverage.

In terms of organizational form, Table 4 shows the distribution within each society type.[33] Pure insurance societies were, relative to mutual insurance societies, more prevalent in the *skills-* and *employer-based* organizational forms while mutuals were relatively more common among *open, special interest,* and *national* organizations. The latter two are organizations which are characterized by having other primary objectives than the provision of sick insurance to members. As such, members of any given special interest organization or trade union may have been fairly homogenous in character. *Open* organizations are only open in the sense that they are not exclusively for members of a certain occupation or place of employment, as such other selection criteria were employed explaining the prevalence of this organizational form among mutual insurance societies.

Several variables indicating financial status are available, *average balance, average assets* and *average debt*. Pure insurance societies yield significantly higher mean levels for all three. The debt/asset ratio gives an indication of financial viability. Mutual insurance societies appear to have a lower mean debt/asset ratio of 1.3 percent compared to the mean for pure insurance societies of 11 percent. However this result is influenced by outliers in the debt variable.[34] Eliminating outliers, the mean for pure insurance societies is lower than for mutual insurance societies. The comparable debt/asset ratio is therefore also lower. Removal of outliers indicates that contrary to the initial picture, pure insurance societies have a lower debt/asset ratio than mutuals.

In terms of stipulated gender requirements 19 percent of pure insurance

[33] *Skills-based* societies are those originally associated with trade guilds *Employer-based* societies are those whose name reflect a place of employment. This category is primarily composed of factory and mining establishments. *Open* societies include a wide array of sick insurance forms, among them; worker associations, hundred-men organizations, local, i.e., geographically based sick insurance societies, fraternity organizations and women's associations. The *special interest* organizational form is composed of a number of interest organizations that do not have sick insurance as their primary objective, among these are non-conformist religious organizations, temperance organizations and local trade unions. The *national* organizations consist of both national sick insurance societies and national trade unions offering sick insurance as part of membership benefits.

[34] One pure insurance society in particular, *Allmänna sbk. i Stockholm,* had average debt levels exceeding 500 SEK/member across all observed years. Other pure insurance societies ranged from 3-16 SEK/member at the upper end of the distribution.

societies restricted membership to males only and 5 percent to females only. The comparable numbers for mutual insurance societies are 22 percent and 4 percent respectively. The remaining societies were characterized by mixed membership policies. Note that these figures are based on policy restrictions, the actual percentage of female members can be seen in the variable *ratio of female members* reported in Table 2. Mutual insurance societies had, on average, a significantly higher ratio of female members than pure insurance societies. There are also differences in the age of the societies.[35] Pure insurance societies are, on average, significantly older than mutual insurance societies.[36] Finally, the number of policy options offered differs between insurance types. Approximately 34 percent of pure insurance societies offered more than one insurance option compared to 26 percent of mutual insurance societies.[37]

9 Pure vs. mutual insurance

Using the available financial and policy variables, a between logit analysis is performed in order to analyze the differences in pure and mutual insurance societies with respect to the given independent variables. Between estimation implies that the logit estimation is based on the mean values of the explanatory variables, per society over time. This because the dependent variable, type of financing system, is constant over time by definition.[38] Several model specifications are estimated with different combinations of

[35]Year of establishment is available in the financial data. Mean values for society age: *Mutuals*: 18.9 years (st. dev. 15.6). *Pure insurance*: 22.6 years (st. dev. 24.0).

[36]There are two outliers, *Snickare-och instrumentmakaresällskapet (*The Association for Carpenters and Instrument Makers*)*, which is the oldest registered society at 240 years in 1910 and *Skrädderiarbetarnes sbk.(*The Society for Tailor Employees*)*, which was 191 years old in 1910. Both these societies are *skills-based* organizations stemming from older trade guilds.

[37]Over 90 percent of both insurance types, however, offer a maximum of two policy options.

[38]There are mutual societies who varied in their use of assessments from year to year, pooled estimation is therefore possible but not consistent with the definition of type of financing system used here. If one defined type of financing system by year, random effects logit estimation would be possible although a check of the quadrature approximation method used in random effects estimation indicates that the results are sensitive to quadrature points and that this estimation procedure should be avoided. Defining type of financing system by year also allows for conditional logit estimation, i.e. within logit estimation but would only capture variation within mutual insurance societies.

the variables in order to ascertain the robustness of the coefficients as well as to avoid multicollinearity problems. As there are several available indicators for, respectively, benefit levels, sick levels and premiums, which are highly and significantly correlated, a principal component analysis is also performed. The analysis based on cross-tabulations and the theory concerning pure contra mutual insurance societies leads us to expect certain relationships, it is therefore interesting to see if these correlations are upheld when controlling for other society characteristics as well as to determine how the available variables affect the likelihood of being one or the other insurance type.

Results, reported in Table 5, report four model specifications.[39] Beginning with mutual insurance societies, higher mean levels of the following explanatory variables increases the likelihood of the insurance society being a mutual; *members*, *average sick days* and *average sick cases*. The dummy variable for *special interest* organizations is also associated with mutual insurance societies regardless of comparison group. Turning to pure insurance societies, higher mean levels of the following variables increases the likelihood of the society being a pure insurance society; *initial fees, insurance coverage per total fees*[40], *average assets, average debts, society age, number of policy categories* and *employer- and skills-based* organizations.

Indicators for insurance coverage to members vary in sign. The variable mean *sick coverage per member* yields negative coefficients while the variable mean *sick coverage per sick day* yields positive coefficients which is also true of the variable mean *sick coverage per sick case*, where significant. Including indicators for member's registered illness levels therefore alters the results based on cross tabulations. The variable *average sick days*, i.e., registered sick days per member, can be seen as a proxy for insurance coverage duration and yields a negative coefficient in the logit estimation. These results therefore suggest that higher coverage per day is associated with pure insurance solutions whereas longer insurance coverage duration is associated with mutual insurance societies. Note that the variable *sick*

[39]Note that the availability of indicators allows for a multitude of model specifications, as such the following discussion is based on results that are robust across both reported and non-reported estimations.

[40]This variable includes all society revenue stemming from insurance payments from members, i.e., includes assessments *ex post*

coverage per member takes into account both dimensions of insurance coverage implying that more generous sick insurance benefits are associated with mutual insurance societies.

Turning to premiums and assessments, higher initial fees are associated with pure insurance societies whereas the coefficients for annual premiums vary in sign. One can not therefore state with certainty that mutuals charge on average higher annual premiums. The variable measuring society expenses per revenue for sick insurance coverage to members, i.e. *sick coverage per total fees*, yields a positive significant coefficient in all model specifications. In means tests, this variable did not significantly differ between pure and mutual societies. The positive coefficient here can be interpreted as an indicator that members of pure insurance societies are getting more sick insurance for their money or, as the variable is based on society financial data, as a signal of precarious policies on the part of pure insurance societies. Pure insurance societies, on average, are spending more on insurance benefits relative their revenue from premiums.

That older societies are associated with pure insurance societies supports the prediction that this type of society develops as actuarial information improves over time. That a higher mean number of policy categories increases the likelihood of the society being pure is also consistent with theoretical observations that pure insurance societies attract a more heterogenous, in terms of risk, clientele and need to differentiate among these risk groups. A higher mean number of policy categories is also dependent on the development of actuarial information which occurs over time and is therefore consistent with the observation that pure insurance societies are on average older. Finally, larger mean levels of the moral hazard control variables, mean *waiting time* and mean *qualifying time*, increases the likelihood of the society being pure, a result which supports the prediction that pure societies must more actively meet moral hazard problems. Finally, consistent with the analysis based on cross-tabulations, *skill-* and *employer-based* organizations are associated with pure insurance societies and *special interest* organizations with the mutual insurance form.[41]

[41]Multicollinearity is a potential problem. In order to minimize this problem a principal component analysis is used to group together the variables that are collinear into a composite index capable of representing the group by itself. This is done for the follow-

10 Selection Issues

There are in total 493 registered insurance societies in Östergötland and Stockholm between 1902-1910, 325 of these existed during the entire observation period. The remaining either entered or exited (or both) the data at some point between 1902 and 1910. There are two sources of selection bias of concern. The first occurs due to so-called initial non-response, that is to say, certain sick insurance societies chose not to register at all. As data is unavailable for these unregistered health insurance societies, one can only speculate as to how these societies differed and for what reasons they chose not to register. One possibility may be that unregistered societies deemed the costs associated with registration to outweigh the benefits. Alternatively, small membership size, lack of administrative routines or administrative staff and/or short longevity may have precluded registration. Finally, registration implied the possibility of public scrutiny of each insurance societies' financial status, being unregistered may therefore have been a signal of poor financial stability.[42]

As the data available is a so-called unbalanced panel, the second source of concern focuses on the possible differences between those societies that existed the entire observation period and those that entered/exited the panel from 1902-1910. A balanced sub-panel is created consisting of 2,925 observations over insurance societies that had annual observations registered from 1902-1910. Attrition from the unbalanced panel to the balanced sub-panel may be a product of entering/exiting insurance societies choosing to begin/end registration during the observation period. Alternatively registered insurance societies may have established later than 1902, dissolved before 1910 or both.[43] Selection from the unbalanced to the bal-

ing groups where correlations among the variables were above 0.50%: registered illness levels, sick insurance coverage, annual premiums (excluding initial fees), and the financial variables average assets and average debts. The principal component for registered illness levels is negative and significant in most specifications. The principal component for sick coverage is positive and significant in all specifications. The principal component for annual premiums yield a negative and significant coefficient in all models. Finally the principal component for the financial variables average asset and average debt yields a positive significant coefficient in all model specifications. The principal component analysis therefore confirms the logit results reported above.

[42]Berge (1995) notes that unregistered insurance societies competed for members with low fees but were often unable to meet their obligations when illnesses occurred.

[43]Of the 168 insurance societies in the data that had less than nine observations, 139

anced sub-panel may be non-random yielding biased estimation results.[44]

The data are separated into three main categories where *survivors* are those insurance societies that have nine observations, i.e. existed during the entire observation period, *entry societies* denotes the group of societies that began registration after 1902 and *exit societies* are those societies that cease registration before 1910. Table 6 indicates that the pure insurance societies are relatively more prevalent than mutuals among *survivors* and *entry societies*. Exit from registration appears to be evenly spread between the two insurance types.[45] Table 6 also makes clear that there is more volatility in Stockholm, 60 percent of entry occurs among Stockholm insurance societies and 67 percent of exits.

Table 7 indicates that in comparison to the distribution over *survivors*, both entry and exit is more prevalent among the *skills-* and *employer-based* organizations and less prevalent among *open* organizations. As the period under observation is characterized by rapid industrial growth, the over-representation of these two types of organizations may be due to the dynamics of the industrial sector, i.e. rapid creation and destruction of firms. The *special interest* and *national* organizations are less likely to exit the data, again compared to *survivors* distribution. This may be a consequence of these two types of organizations having other primary objectives than the provision of sick insurance.

A look at the sample means shown in Tables 8 and 9, shows that there are some interesting differences between survivors and entry societies as well as survivors and exit societies. *Entry societies* have a smaller mean membership than *survivors* which may be a consequence of them being, on average, younger[46] or relatively more heavily concentrated in the *skills-*

entered at some point after 1902, 39 exited before 1910 and ten societies both entered and exited between 1902 and 1910. Some insurance societies may have merged with others, a process not controlled for other than that they cease to be registered under the old name, i.e. exit from the data.

[44]Duration analysis is not completed as exit from the data does not imply exit from the insurance market. As such, results from duration analysis would be difficult to interpret.

[45]Information on the category *entry and exit* is included although this category consists of only 10 insurance societies (33 observations) and is already represented in the entry and exit statistics.

[46]Mean society age: survivors 22.79 years (st. dev.: 22.02), entry societies: 14.87 years (st. dev.: 14.77).

based organizations which are characterized by smaller mean memberships. The sample statistics also indicate that *entry societies* have a larger mean annual income, per member, from premiums and assessments as well as stating higher, on average, annual premiums in their policy statutes. They therefore appear to offer more expensive insurance coverage to members. Although indicators for insurance coverage show higher mean levels both in terms of actual society expenses for sick coverage to members and in terms of policy variables such as mean coverage per week, the variable *sick coverage per paid total fees* (including assessments) are significantly lower for *entry societies* than for *survivors*. *Entry societies* therefore have lower expenses for sick insurance coverage per income from premiums and assessments.

Turning to the differences between *exit societies* and *survivors*, the sample means show that mean membership is significantly and considerably smaller. This can in part be due to the distribution of these societies among organizations with smaller mean membership, but is also likely to be an indicator of the problems for insurance societies associated with small membership size. The indicators for society expenses due to sick coverage, available in the financial data, show that *exit societies* had higher mean levels than *survivors* despite stipulating lower mean levels in the policy data.

Logit estimation on the unbalanced panel including the selection terms n_i, the number of years health insurance society i is observed and *survivor*, a 0 - 1 variable equal to one if insurance society i is observed all nine periods, yield that frequency of observations, n_i, has a negative significant coefficient while survivor is insignificant. The selection terms therefore indicate that insurance societies with a greater number of observations, when controlling for other observable factors, are more likely to be mutual insurance societies.

The logit estimation on the balanced sub-panel yield results[47] that do not greatly differ from the unbalanced panel results.[48] The main results

[47]See balanced sub-panel logit estimation results, Table 10.

[48]Differences include that mean *coverage per week* yields a negative significant coefficient in model one. The principal component for this group of inter-correlated variables indicating sick insurance coverage levels, however remains positive across all model specifications. The moral hazard control variable *minimum sick days* is significantly as-

from the unbalanced panel estimation are upheld indicating that selection bias between the balanced and unbalanced panel is not an issue in terms of determining how different variables influence the probability of being one or the other type of insurance society. This implies that although the balanced sub-panel is composed of a selection of insurance societies observed during the entire 1902-1910 period and therefore characterized by greater stability and presumably sounder financial strength, this does not affect the likelihood of being a pure contra mutual insurance society.

11 Conclusion

This paper, based on data from voluntary Swedish sick insurance societies 1902-1910, has systematically analyzed the differences between pure and mutual insurance societies and estimated how different variables affect the probability of being one or the other insurance type. The results reported are obtained from a short panel over a relatively turbulent period of Swedish sick insurance history and as such should be viewed as preliminary. This study does however provide an indication as to whether theoretical predictions concerning pure contra mutual insurance are empirically supported.

Mutual insurance societies were found, on average, to be significantly larger than pure insurance societies, despite theoretical predictions to the contrary. In terms of insurance benefits the data indicate that pure insurance societies are associated with greater coverage levels while mutual insurance societies with longer coverage duration. A variable incorporating both dimensions shows that mutual insurance societies offer more generous insurance packages. In terms of the cost of this insurance to members, the analysis unequivocally shows that pure insurance societies charged higher mean initial fees. The results for annual premiums are however not robust and nothing conclusive can be said about annual costs to members for sick insurance.

Pure insurance societies are associated with greater levels of moral hazard controls, supporting the theoretical prediction that mutuals have built

sociated with pure insurance societies reinforcing the result that higher levels of moral hazard controls increases the likelihood of the society being pure.

in controls for moral hazard behavior. Pure insurance societies are also, on average, older, a result consistent with theoretical notions that this type of society develops over time as actuarial information improves. Finally, a higher mean number of policy categories increases the likelihood of the society being pure which is also consistent with predictions that pure insurance societies attract a more heterogenous clientele.

The results reported here, therefore, do not contradict that there may be a sorting of different risk types into the two types of insurance societies. Mutual insurance societies are found, on average to offer more generous insurance coverage to members presumably due to built in controls for moral hazard behavior and to a selection of better risk types. Pure insurance societies on the other hand, attract a more heterogenous clientele lacking the motivation to minimize moral hazard problems as indicated by a higher mean number of policy categories and by higher mean levels of moral hazard controls.

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13 Appendix:

13.1 Tables:

Table 1: No. of registered sick insurance societies & members, Stockholm & Östergötland, 1902-1910.

	Total		*Mutual Insurance*		*Pure Insurance*	
Year	societies	members	societies	members	societies	members
1902	354	94 706	165	56 014	189	38 692
1903	382	105 031	181	60 931	201	44 100
1904	410	117 132	191	67 281	219	49 851
1905	424	125 138	197	71 774	227	53 364
1906	441	135 666	204	76 063	237	59 603
1907	455	146 737	210	81 832	245	64 905
1908	459	152 443	211	85 700	248	66 743
1909	464	161 758	213	90 708	251	71 050
1910	454	166 341	204	90 372	250	75 969

Table 2: **Sample means by type of insurance society, mutual contra pure**: **Financial Accounts**. Standard deviation in parenthesis.* indicates significant difference at 1 percent level, ** at 5 percent level, in means test.

	Mutual Insurance	*Pure Insurance*
Financial Accounts		
Male members*	255.6 (740.1)	168.9 (243.2)
Female members*	127.7 (456.9)	84.8 (176.5)
Ratio of female members*	0.31 (0.26)	0.29 (0.25)
Avg. male sick cases*	0.25 (0.16)	0.20 (0.11)
Avg. female sick cases*	0.21 (0.15)	0.20 (0.12)
Avg. male sick days*	6.30 (4.65)	5.18 (3.43)
Avg. female sick days*	6.87 (10.85)	5.93 (7.07)
Male sick days/sick case	26.63 (12.34)	26.14 (12.55)
Female sick days/sick case	32.19 (27.79)	31.08 (20.79)
Avg. premium paid[a)]	8.28 (4.12)	8.07 (3.72)
Avg. assessment paid	2.49 (5.16)	-
Avg. admin. subsidy**	1.16 (0.40)	1.19 (0.50)
Avg. sick coverage*	7.83 (3.83)	6.61 (3.67)
Sick coverage/sick day	1.30 (0.63)	1.31 (0.74)
Sick coverage/sick case[b)]	35.08 (23.93)	34.10 (18.23)
Sick coverage/annual fees[c)]*	1.55 (3.14)	0:85 (0.38)
Sick coverage/annual tot. fee[d)]	0.85 (0.39)	0.85 (0.38)
Medical exp./sick day*	0.01 (0.06)	0.03 (0.12)
Medical exp./sick case*	0.38 (1.61)	0.63 (2.48)
Avg. administration cost*	1.63 (1.23)	1.35 (1.11)
Avg. variable cost*	9.46 (5.62)	7.91 (6.17)
Avg. balance*	1.88 (3.09)	3.06 (4.63)
Avg. assets*	26.46 (22.94)	43.63 (64.87)
Avg. debt*	0.22 (1.34)	2.83 (45.11)

[a)]The means test for this variable indicates a significant difference at the 10% level. The mutual mean is significantly larger than the pure insurance mean at the 5% level.

[b)]Mean sick coverage per sick case is signigicantly larger for mutual insurance societies compared topure insurance societies at the 10% level.

[c)]This variable is generated from the financial data and is equal to: (Expenses-*sick coverage paid)*/(Income-annual fees). Note: assessments *ex post* not included.

[d)]This variable is equal to: (paid sick coverage to members)/(annual fees+annual assessments).

Table 3: **Sample means by type of insurance society, mutual contra pure**: **Policy Statutes**. Standard deviation in parenthesis.* indicates significant difference at 1 percent level, ** at 5 percent level, in means test.

	Mutual Insurance	*Pure Insurance*
Policy Statutes		
Mean min.age**	16.37 (1.41)	16.26 (1.52)
Mean max. age**	48.81 (7.32)	48.16 (9.39)
Mean min. initial fee*	2.17 (2.96)	2.75 (5.25)
Mean max. initial fee*	2.73 (3.35)	3.11 (5.40)
Mean min premium*	8.31 (4.30)	7.88 (3.99)
Mean max premium*	8.60 (4.66)	8.24 (4.47)
Mean assessment (illness)	0.18 (0.26)	-
Mean assessment (funeral)[a)]	0.88 (2.48)	0.47 (0.05)
Mean guaranty fee[b)]	0.24 (1.79)	-
Mean waiting time (illness)*	78.0 (67.3)	95.1 (69.4)
Mean waiting time (funeral)*	60.1 (70.6)	93.1 (147.3)
Mean qualifying time*	0.25 (1.2)	0.75 (5.5)
Mean min. duration	5.4 (2.6)	5.3 (3.7)
Mean full coverage	63.0 (32.5)	63.3 (32.6)
Mean half coverage	5.0 (26.7)	5.5 (19.4)
Mean full coverage per case	32.6 (72.7)	29.4 (67.0)
Mean half coverage per case	57.8 (182.2)	48.6 (181.8)
Mean coverage per week	8.85 (3.78)	8.76 (4.23)
Mean funeral coverage*	115.3 (189.4)	67.39 (60.43)
Mean funeral coverage, wife[c)]*	5.78 (31.29)	2.94 (11.07)

[a)]There are seven pure insurance societies who register assessment values for funeral insurance only in their policy statutes yet no income from assessments.

[b)]There are eight mutual insurance societies who charge a guranty fee (56 observations). The size of this fee ranges from 3-25 SEK.

[c)]18 mutual insurance societies (158 observations) and 21 pure insurance societies (178 observations) offered funeral coverage for member's wife.

Table 4: **Organizational Form**. **Distribution by type of insurance society**, **mutual contra pure**.

	Mutual insurance			*Pure insurance*		
		Members			Members	
org. form	%	Mean	St. dev.	%	Mean	St. dev.
Skills based	10.5	146.52	125.27	18.0	143.23	129.73
Employer based	10.4	306.35	250.83	12.2	222.93	276.31
Open	57.9	436.59	1459.19	55.3	275.12	364.19
Special Interest	8.5	115.25	104.16	5.1	117.09	66.25
National	7.4	855.75	1055.53	4.1	787.35	858.99
Other	5.3	228.86	286.84	5.3	183.55	124.69

Table 5: Logit estimation, unbalanced panel. Dependent variable: Pure Insurance Societies. Explanatory variables are mean levels per society. Standard errors in parenthesis. f/p indicates if explanatory variables originate from financial accounts or policy statutes. * indicates significance at 1% level, ** at 5% level, *** at 10% level.[49]

		1	2	3	4
members*10	f	−0.013** (0.006)	−0.007 (0.005)	−0.011*** (0.006)	−0.011*** (0.006)
avg. sick days	f	0.102** (0.044)	−0.029 (0.021)	.	.
avg. sick cases	f	-0.544 (1.416)	.	−1.867* (0.623)	−7.174* (0..689)
mean sick coverage/week	p	0.012 (0.026)	0.006 (0.013)	.	.
sick cov./member	f	-0.293* (0.082)	.	.	.
sick cov./sick day	f	1.492* (0.264)	.	0.755* (0.109)	.
sick cov./sick case	f	0.011 (0.010)	.	.	.
max. initial fee	p	0.028* (0.010)	0.016** (0.008)	0.030* (0.013)	.
max. annual premium	p	−0.089* (0.023)	.	0.035* (0.012)	.
avg. premium paid	f	0.220* (0.057)	−0.090* (0.017)	.	0.069* (0..015)
sick cov./tot fees	f	42.094* (2.292)	.	1.937* (0.190)	0.805* (0.002)
avg. assets	f	0.024* (0.003)	0.023* (0.002)	.	0.018* (0.002)
avg. debt	f	-0.010 (0.010)	.	0.022* (0.004)	−0.017* (0.005)
avg. balance	f	−0.119* (0.028)	−0.005 (0.020)	0.184* (0.020)	.
waiting time-illness	p	0.002* (0.001)	0.002* (0.001)	0.003* (0.001)	0.003** (0.001)
qualifying time	p	0.288* (0.075)	0.125* (0.036)	.	0.044* (0.021)
min.duration	p	0.031*** (0.019)	.	−0.009 (0.012)	.
society age	f	.	.	.	0.008* (0.002)
ratio of female members	f	.	.	.	-0.141 (0.152)
nr. of policy options	p	.	.	.	0.131* (0.047)
constant	-	−1.089** (0.445)	1.457* (0.214)	−1.773* (0.259)	−0.591* (0.275)
Psuedo R^2	-	0.4372	0.1314	0.1029	0.1101
no. of observations	-	3835	3843	3835	3763

[49]Other control variables: sick coverage per annual fees in model 1, organisation and region dummies in model 4, average administration cost and average variable cost in model 1 and 3.

Table 6: **Distribution of survivors, entry societies and exit societies**

	survivors	*entry societies*	*exit societies*	*entry & exit*
Mutual insurance	45.9	45.4	51.9	27.3
Pure insurance	54.1	54.6	48.1	72.7
Stockholm	52.6	60.1	67.1	100.0
sterg tland	47.4	39.9	32.9	0.0

Table 7: **Organizational distribution of survivors, entry societies and exit societies**.

	survivors	*entry societies*	*exit societies*	*entry & exit*
Skills based	12.0	22.1	28.2	48.5
Employer based	9.9	17.8	11.1	21.2
Open	60.3	41.8	49.5	21.2
Special Interest	7.1	6.8	1.4	9.1
National	5.2	7.6	3.2	-
Other	5.5	3.9	6.5	-

Table 8: **Sample means, survivors, entry societies & exit societs**: **Financial Accounts**. Standard deviation in parenthesis.* indicates significant difference at 1 percent level, ** at 5 percent level, in means test, in comparison to survivors.

	survivors	*entry societies*	*exit societies*
Financial Accounts			
Male members	226.6 (596.0)	164.7 (279.4)*	99.8 (82.2)*
Female members	115.4 (372.0)	76.07 (201.1)*	41.2 (64.6)*
Ratio of female members	0.31 (0.24)	0.26 (0.30)*	0.27 (0.27)**
Avg. male sick cases	0.23 (0.14)	0.21 (0.13)**	0.23 (0.11)
Avg. female sick cases	0.20 (0.13)	0.20 (0.16)	0.23 (0.13)**
Avg. male sick days	5.78 (4.21)	5.25 (3.56)*	6.02 (3.62)
Avg. female sick days	6.44 (9.80)	5.69 (5.33)	7.76 (6.07)
Male sick days/sick case	26.40 (12.46)	26.12 (12.66)	26.32 (11.04)
Female sick days/sick case	31.28 (23.84)	31.05 (20.44)	37.71 (37.64)*
Avg. premium paid	8.01 (3.87)	8.71 (4.11)*	8.55 (3.49)**
Avg. assessment paid	2.21 (3.20)	3.39 (9.89)*	2.82 (2.87)
Avg. admin. subsidy	1.18 (0.44)	1.10 (0.54)*	1.28 (0.32)*
Avg. sick coverage	7.04 (3.60)	7.44 (4.49)*	8.00 (3.52)*
Sick coverage/sick day	1.26 (0.61)	1.46 (0.95)*	1.38 (0.49)*
Sick coverage/sick case	33.02 (14.50)	39.33 (36.11)*	38.84 (23.52)*
Sick coverage/annual fee	1.19 (2.34)	0.98 (1.24)**	1.45 (2.12)
Sick coverage/annual tot. fee	0.87 (0.39)	0.79 (0.37)*	0.84 (0.32)
Medical exp./sick day	0.02 (0.10)	0.01 (0.09)**	0.03 (0.08)
Medical exp./sick case	0.52 (1.98)	0.42 (2.50)	0.69 (2.44)
Avg. administration cost	1.44 (1.16)	1.54 (1.20)**	1.93 (1.19)*
Avg. variable cost	8.49 (5.70)	8.89 (7.26)	9.70 (4.16)*
Avg. balance	2.41 (3.28)	3.15 (6.23)*	1.87 (3.67)**
Avg. assets	37.13 (55.55)	29.43 (27.04)*	40.74 (43.79)
Avg. debt	2.04 (37.94)	0.27 (1.20)	0.26 (1.01)

Table 9: Sample means, survivors, entry societies & exit societies: Policy Statutes. Standard deviation in parenthesis.* indicates significant difference at 1 percent level, ** at 5 percent level, in means test, in comparison to survivors.

	survivors	*entry societies*	*exit societies*
Policy Statutes			
Mean min.age	16.26 (1.47)	16.52 (1.29)*	16.56 (2.00)**
Mean max. age	48.14 (8.17)	49.45 (9.25)*	49.69 (9.66)**
Mean min. initial fee	2.44 (4.25)	2.85 (5.10)*	2.08 (3.81)
Mean max. initial fee	2.96 (4.50)	3.12 (5.25)	2.41 (4.02)**
Mean min premium	7.99 (3.94)	8.86 (4.52)*	6.48 (4.84)*
Mean max premium	8.29 (4.36)	9.28 (5.02)*	6.78 (4.95)*
Mean assessment (illness)	0.01 (0.06)	0.00 (0.01)	0.01 (0.03)
Mean assessment (funeral)	0.61 (0.63)	2.02 (5.71)*	0.80 (0.61)**
Mean guaranty fee	0.04 (0.47)	0.35 (2.53)*	0.33 (1.25)*
Mean waiting time (illness)	88.67 (62.46)	77.40 (52.01)*	95.13 (150.54)
Mean waiting time (funeral)	76.03 (85.77)	73.97 (121.07)	111.58 (322.02)*
Mean qualifying time	0.48 (3.97)	0.80 (5.19)**	-
Mean min. sick days	5.46 (2.38)	4.90 (5.48)*	4.81 (3.02)*
Mean full coverage	65.21 (30.88)	56.69 (34.41)*	56.38 (42.65)*
Mean half coverage	5.17 (24.26)	5.34 (18.31)	5.90 (18.33)
Mean full coverage per case	30.12 (69.80)	34.67 (72.61)	24.89 (52.19)
Mean half coverage per case	50.30 (179.34)	61.09 (183.85)	51.26 (193.82)
Mean coverage per week	8.54 (3.04)	10.04 (6.17)*	7.84 (5.38)*
Mean funeral coverage	87.54 (130.40)	101.49 (176.45)*	73.06 (59.98)**
Mean funeral coverage, wife	4.50 (25.13)	3.88 (13.90)	1.67 (8.52)**

Table 10: Logit estimation, balanced sub-panel. Dependent variable: Pure Insurance Societies. Explanatory variables are mean levels per society. Standard errors in parenthesis. f/p indicates if explanatory variables originates from financial accounts or policy statutes. * indicates significance at 1% level, ** at 5% level, *** at 10% level.[50]

		1	2	3	4
members*10	f	−0.021* (0.007)	−0.008 (0.005)	−0.012** (0.006)	−0.015** (0.007)
avg. sick days	f	0.167* (0.054)	−0.035 (0.027)	.	.
avg. sick cases	f	-0.835 (1.887)	.	0.161 (0.738)	−5.681* (0.803)
mean sick coverage/week	p	-0.097** (0.042)	0.017 (0.021)	.	.
sick cov./member	f	−0.056 (0.107)	.	.	.
sick cov./sick day	f	2.440* (0.341)	.	1.136* (0.140)	.
sick cov./sick case	f	−0.005 (0.016)	.	.	.
max. initial fee	p	0.093* (0.015)	0.258* (0.010)	0.040* (0.030)	.
max. annual premium	p	−0.184* (0.033)	.	0.028** (0.015)	.
avg. premium paid	f	0.712* (0.083)	−0.083* (0.021)	.	0.051* (0.018)
sick cov./tot fees	f	22.229* (1.869)	.	2.068* (0.218)	1.003* (0.210)
avg. assets	f	0.047* (0.004)	0.026* (0.003)	.	0.016* (0002)
avg. debt	f	0.009 (0.021)	.	0.025* (0.005)	−0.014** (0.006)
avg. balance	f	−0.452* (0.055)	−0.075* (0.030)	0.189* (0.024)	.
waiting time-illness	p	0.006* (0.001)	0.004* (0.001)	0.004* (0.001)	0.005* (0.001)
qualifying time	p	0.311* (0.078)	0.214* (0.053)	.	0.116* (0.048)
min.duration	p	0.100* (0.022)	.	0.027 (0.018)	.
society age	f	.	.	.	0.006* (0.003)
ratio of female members	f	.	.	.	0.142 (0.187)
nr. of policy options	p	.	.	.	0.195* (0.061)
constant	-	−1.974* (0.570)	0.995* (0.271)	−2.856* (0.324)	−0.968* (0.319)
Psuedo R^2	-	0.3384	0.1242	0.1059	0.1108
no. of observations	-	2925	2925	2925	2898

[50]Other control variables: sick coverage per annual fees in model 1, organisation and region dummies in model 4, average administration cost and average variable cost in model 1 and 3.

13.2 Variable list

Financial Accounts:

Year of establishment
No. of members, by gender
No. of sick cases, by gender
No. of sick days for which coverage was paid, by gender
Income:
- Annual fees
- Ex-post assessments
- Administration subsidy
- Interest
- Other

Expenses:
- Sick coverage paid
- Funeral coverage paid
- Medical fees, medicine, physician fees
- Administration costs
- Other

Balance
Assets:
- Total
- Liquid amount

Debts

Statutes:

Optional/mandatory membership
No. of policy categories
Sex of members: male, female, both
Min./Max. age
Initial membership fee
Annual fees
Ex-post assessments:
- For health coverage, per week and member
- For funeral coverage, per death and member

Guarantee fee
Waiting time after entry for health coverage
Waiting time after entry for funeral coverage
Qualifying time after registration of illness for health coverage (karenstid)
Minimum sick days for health coverage
Maximum health coverage per year
- Whereafter half coverage, days

Maximum health coverage per registered sick case
- Whereafter half coverage, days

Health coverage per week (SEK)
Funeral coverage per member (SEK)
Funeral coverage for wife (SEK)

13.2.1 Category variables and definitions

Region:

Östergötland: A 0 - 1 variable equal to one when the insurance society is situated in Östergötland and zero for Stockholm.

Organization:

skills-based, employer-based, open, special interest, national other

Membership size:

members - total no. of female and male members

Registered illness levels:

average sick days - registered sick days/members
average sick cases - registered sick cases /members

Sick insurance coverage:

mean sick coverage per week,
sick coverage per member - (expenses:sick coverage paid)/members
sick coverage per sick day - (expenses:sick coverage paid)/registered sick days,
sick coverage per registered sick case - (expenses:sick coverage paid)/registered sick cases

Insurance costs to members:

maximum initial fee
maximum annual premium
average premium paid - (income:annual fees)/members

Insurance coverage per cost:

sick coverage per annual fees - (expenses:sick coverage paid)/(income:annual fees)
sick coverage per total fees - (expenses:sick coverage paid)/(income:annual fees + assessments)

Society costs:

average administration cost -(expenses:administration cost)/members
average variable cost - (total expenses-administration costs)/members

Financial status:

average assets - assets/members
average debt - debt/members
average balance - balance/members

Moral hazard controls:

waiting time-sick coverage
qualifying time
minimum sick days